A Message from Paul Yock

Needless to say, 2020 was anything but business as usual! As classrooms went dark, maker spaces closed, students scattered, and staff and faculty headed home to work from kitchen tables, we turned to a practice we know well—we innovated.

Our first unmet need involved finding new ways to connect with trainees and deliver a robust educational experience online. Zoom classrooms, breakout rooms, virtual whiteboards, and other creativity tools helped us recreate an interactive and collaborative environment. While replicating the high-touch nature of Biodesign's programs wasn't easy, the commitment of our instructors and coaches, enthusiasm of our mentors and guest speakers, and – especially – the resilience of our fellows and students, made the transition remarkably smooth. The caliber of the work coming out of our 2020 programs was equal (if not better, in some cases) than years past. And we were heartened to hear from trainees that their projects helped them feel connected and grounded in difficult times.

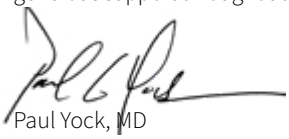
A second focus was determining how the Stanford Biodesign community could help respond to the COVID-19 pandemic. A number of our alumni and faculty were on the medical front lines, leading hospital and government responses and volunteering as caregivers in hard-hit cities. From an innovation standpoint, our 2019-20 Innovation Fellows expanded their workload to undertake needs finding initiatives in specific pandemic-related areas. This effort resulted in some promising solutions, including a low-cost way to prevent the spread of viral particles during respiratory procedures that generate aerosols. In partnership with the Department of Bioengineering, we also launched the Coulter COVID-19 Rapid Response grant program to fund innovative therapeutics, devices, and technologies with the potential for a near-term impact, with several of these projects ongoing.

In summer 2020, the killing of George Floyd and the related Black Lives Matter protests spurred us to more deeply consider our own role in perpetuating institutionalized racism. Our alumni of color stepped up to help us mobilize a racial equity and inclusion task force to evaluate our current policies and practices with a goal of making Stanford Biodesign more just and inclusive. Staying true to our process, this group started with a needs finding exercise and is now working on improvements in three core areas: recruiting and selection, the fundamental process that we teach, and diversifying the network and community that supports our trainees during and after their time in our programs.

In parallel, we expanded the purview of Diversity by Doing or DxD Healthtech, an industry-wide diversity initiative led by Stanford Biodesign and Fogarty Innovation. DxD launched last year with a focus on gender equality. This year, we carried that mission forward and began to lay the groundwork to address other axes of diversity, including race. One recent highlight has been a series of virtual speed mentoring events that connect early and mid-career women with industry veterans who can provide targeted guidance on career questions and challenges in our field. Another is a new program to encourage health technology companies to hire summer interns from groups historically underrepresented in STEM jobs, and provide those interns with a training program that will enrich their exposure to health technology and help them build a network of mentors and peers.

On a personal note, after 20 years as the director of Stanford Biodesign, I will move into a more limited role in 2021. We will announce the new director in the spring, and they will formally take the helm in August. The search yielded some really extraordinary candidates and the person we expect to welcome into the position is someone who will provide truly dynamic leadership. Stay tuned!

As we move into our third decade I'm more excited than ever about what's ahead for Stanford Biodesign, including our eventual return to in-person operations. While we've accomplished a lot this year, we've deeply missed the human connection that comes from being together. I look forward to seeing all of you soon! In the meantime, on behalf of the faculty, staff, fellows and students at Biodesign, a sincere thank-you for your continued and generous support throughout this remarkable year.



Paul Yock, MD
Founder and Director, Stanford Byers Center for Biodesign

2020 Highlights: 10 things that made us happy and proud in a challenging year

1. 2019-20 Stanford Biodesign Innovation Fellows Launch

Despite the difficulties posed by COVID, all our 2019-20 Biodesign Innovation Fellows have graduated into impressive new careers. Several fellows returned to medicine, while others took positions at leading organizations including IDEO, Life Science Angels, and Santé Ventures. In addition, two projects from the fellowship are moving forward at an impressive pace:

2019-20 Innovation Fellows

Jay Dhuldhoya and Francis Wong formed **Auricle** to work on a less invasive and reversible solution for high frequency hearing loss. After receiving high-touch business mentoring over the summer from our partner, Fogarty Innovation, the team won grant funding from Spectrum and the Wu Tsai Neuroscience Institute, launched a clinical study with Stanford Medicine principal investigator Peter Santa Maria, and recently completed several proof-of-concept cases.

James Kintzing and Brandon McCutcheon formed **Spirair** to pursue an office-based solution for nasal septal deviation. The team was also mentored by Fogarty Innovation and won Spectrum grant funding. Working with Stanford otolaryngologist Jayakar Nayak, the team has made stellar progress and expects to complete its first-in-human case by the end of the year. As of this writing, the team has entered the new Invention Accelerator Program jointly developed by Biodesign and Fogarty Innovation.

2. Innovation Course Teams Address COVID-19

Two teams of multidisciplinary graduate students from the two-quarter Biodesign Innovation course are also moving projects forward. Team Calumeo developed a point-of-care solution to quickly disinfect N-95 masks. They qualified for Biodesign summer extension funding/the Fogarty Innovation summer accelerator program, and won the Johns Hopkins University COVID-19 Design Challenge and grants from the Stanford Graduate School of Business and the Stanford Center for Innovation in Global Health. The team's solution met FDA requirements for Emergency Use Authorization and they expect to deliver their technology to the market in the near term.

Another team of students that came together in the course went on to participate in Stanford Rebuild, a global innovation sprint focused on developing solutions to address post-COVID challenges. There, they developed Pocket RN, an app that allows patients and caregivers to videochat with nurses who have expertise in their area of need and can coach them through their questions on at-home procedures. The app seeks to bridge the gap between the 50 million patients who need care in their homes and the critical shortage of nurses able to provide these services. The Pocket RN team is currently preparing for a 6-month pilot test of the app in partnership with a leading health system.

Francis Wong and Jay Dhuldhoya at work in the garage

3. Capstone Students Tackle River Blindness

A team of undergraduate students from the Senior Bioengineering Capstone course developed a device to painlessly and more accurately diagnose river blindness. This parasitic disease endemic to rural Central Africa causes severe itching, skin lesions, and debilitating vision loss. The team won Biodesign NEXT funding to continue working on their project after the end of the class, and completed a final two quarters of work in their living rooms and garages. The device they built won the top prize and $20,000 at the annual DEBUT competition administered by NIH, which challenges students in undergraduate biomedical classes to solve real-world health problems. While the team doesn't plan to develop the technology themselves, they are publishing their work with the goal of making it available to others in the global health space.

Mr. Worldwide Health, the river blindness student team

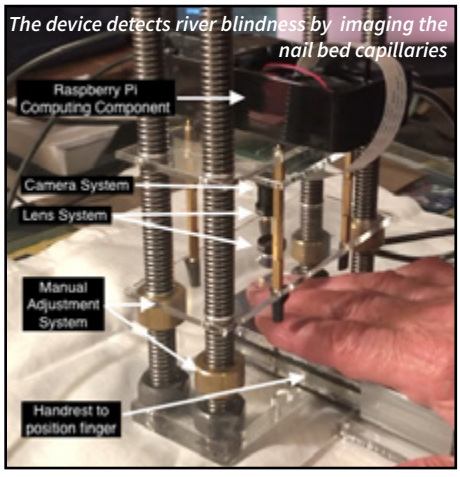
4. 2020-21 Innovation Fellows Conduct In-Person Observations

With help from Glen Chertow, chief of Stanford nephrology, and Eila Skinner, chair of Stanford urology, as well as Zach Edmonds, chair of hospital medicine at the Palo Alto Foundation Medical Group, our 2020-21 Innovation Fellows were able to experience in-person clinical immersion as they looked for unmet needs in urology.

5. Biodesign's Digital Health Offerings Expand

Led by Oliver Aalami and a dedicated team, Biodesign's offerings in digital health became increasingly robust. The team launched Building for Digital Health, a new course that pairs Stanford medicine faculty working on digital health projects with computer science students interested in health care. One project that resulted is Care-It, an app that engages patients and families in end-of-life planning by empowering patients to independently document their wishes. The CARE-IT team is working with Stanford Health Care to conduct a pilot of the app with patients this spring.

Aalami and others also teamed up with engineers from Apple Health and Google Cloud to develop CardinalKit, an open source framework that dramatically cuts the time and cost required to build secure, compliant digital health apps. The framework debuted in a virtual Digital Health Buildathon that drew over 300 participants and resulted in 12 new projects. Now, the community of CardinalKit users is growing rapidly.

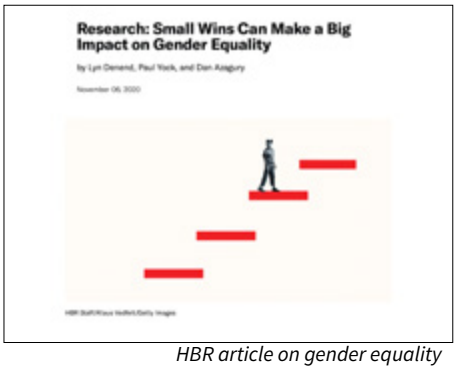


The device detects river blindness by imaging the nail bed capillaries

One of the two 2020-21 Innovation Fellowship teams

6. Articles on Gender in Health Technology Publish

In 2019, in an effort to better understand the state of gender diversity in health technology, we developed a survey to explore leadership representation and perceptions of workplace equality, job satisfaction, and work-life balance. The results from over 400 health technology professionals revealed that women are significantly underrepresented in senior leadership and that there are major differences in how men and women experience the workplace. We wrote a comprehensive article on our findings, which was printed in 2020 in the *Annals of Biomedical Engineering*. We published a second article in the *Harvard Business Review* that explored how these gender differences played out at Stanford Biodesign, and how we are using the small wins model of change to make simple changes that will lead to larger success.



HBR article on gender equality

7. Singapore Biodesign Graduates Inaugural Fellows

After eight years as Singapore-Stanford Biodesign, the Singapore program became an independent program in December 2018. In 2020, the program graduated its first batch of fellows. We're extremely proud of the entire team and glad the inaugural fellows were able to visit us at Stanford early in 2020, prior to the shutdown.

2020 Singapore Biodesign Fellows

8.India Efforts Progress

From Stanford-India Biodesign to the ongoing series of Founder's Forums, Rajiv Doshi, director of the Stanford Biodesign India Program, and Anurag Mairal, director of Stanford Biodesign's Global Outreach Program, have been at the forefront of efforts to catalyze the Indian health technology ecosystem and help innovators get their products to patients. Two major announcements this year underscore the success of their efforts.

Rajiv Doshi and Anurag Mairal

The School of International Biodesign, which launched as Stanford-India Biodesign in 2007 and became an independent program in 2016, has been designated the flagship health technology innovation training program of the Department of Biotechnology, India. And, the Indian government's National Health Authority launched a major initiative called the Market Access Programme to promote the uptake of novel medical technologies into its public healthcare system. Doshi and Mairal were asked to join the expert advisory group for the effort.

9. Japan Biodesign Promoted

The University of Tokyo, one of our three Japan Biodesign partners, promoted Tokyo Biodesign from a program to an official department of the university hospital. Yujiro Maeda, a 2014 Global Faculty Trainee and co-director of the Japan Biodesign program, has been appointed as director. Fumiaki Ikeno, program director (US), is continuing in his role as an advisor to the department. Leaders from the different programs around the country have also recently created a national organization called the Society of Japan Biodesign.

A farewell dinner at the Japanese Consulate

10. Stanford Biodesign-Fogarty Innovation Partnership Formalized

Stanford Biodesign continues to deepen its relationship with our longtime partner Fogarty Innovation. We are now working together formally in a number of areas, including an invention accelerator program, and on policy initiatives such as Diversity by Doing/DxD Healthtech.

Our Impact

Stanford Biodesign is proud to have helped educate and empower...

183 Innovation Fellows since 2001

2,225+ Stanford students since 2002

153 global fellows and faculty since 2015

74 Stanford faculty since 2015

Snapshots


The second 2020-21 Innovation Fellowship team


Alumni fellow Abubaker Khalifa is helping with our internal diversity efforts


Biodesign mentors Bev Huss, Josh Makower, and Maria Sainz


Fogarty Innovation CEO Andrew Cleeland interviews Paul Yock about his career

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We are exceptionally grateful to the following sponsors who have helped advance the Stanford Biodesign mission. Thank you for your continued support!

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For more information on how you can support Stanford Biodesign, please contact Allie Gregorian at (650) 724-9910 or Robert Busch at (650) 223-9121.

For other information about Stanford Biodesign, email Stacey McCutcheon at staceypm@stanford.edu or visit us online.